
NAS Architecture and Research & Development Efforts

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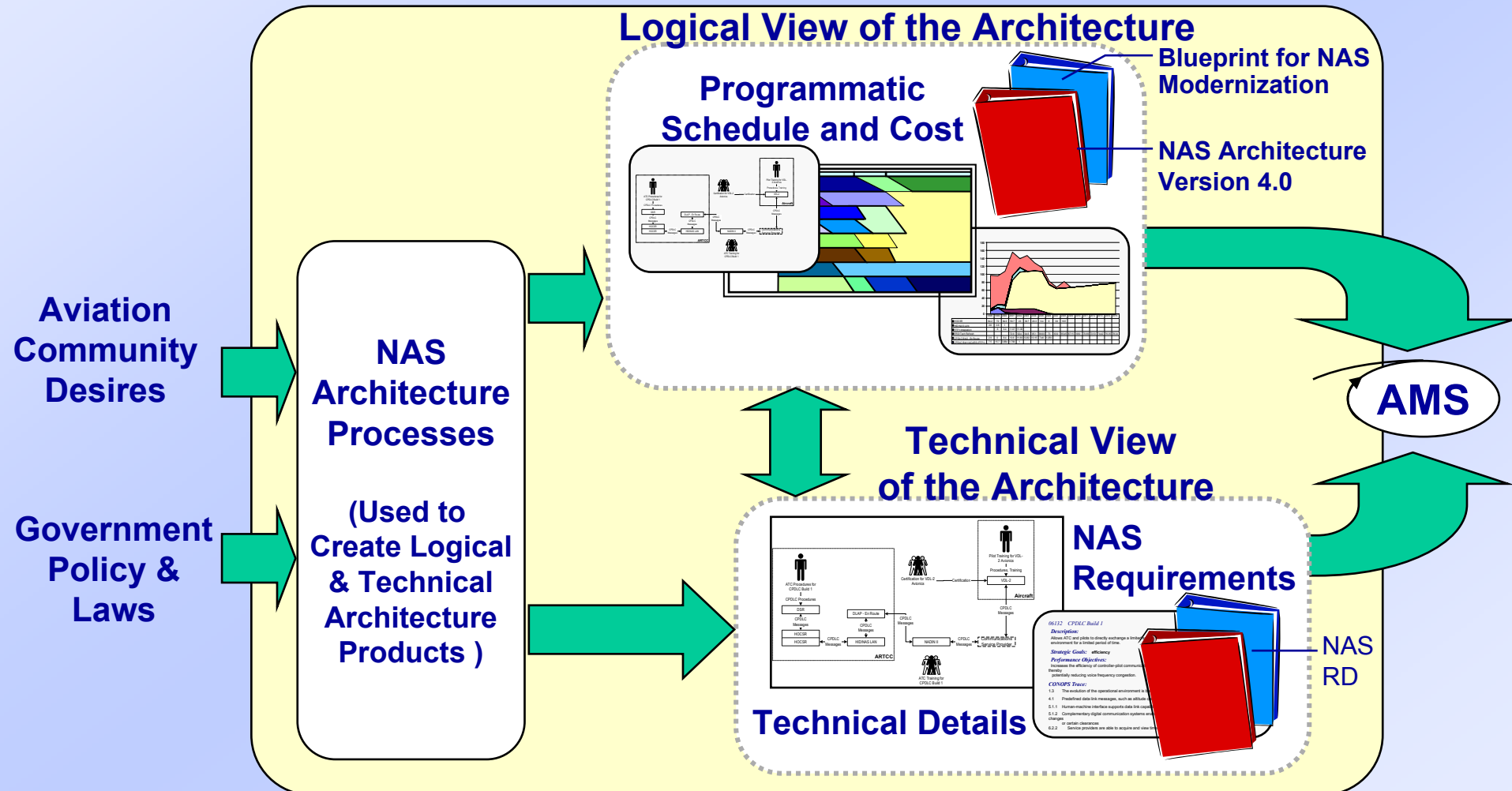
NAS Architecture



- **“Living” representation of the FAA’s strategic plan for NAS modernization**
- **Promotes FAA/industry collaboration and communication**
- **Supports the FAA acquisition decision processes**
 - **Allows the system to be placed under control**
 - **Aids in the clarification of requirements and assessment of their impact on system design**
- **Supports the FAA annual budget decision process**



The NAS Architecture





The Logical View

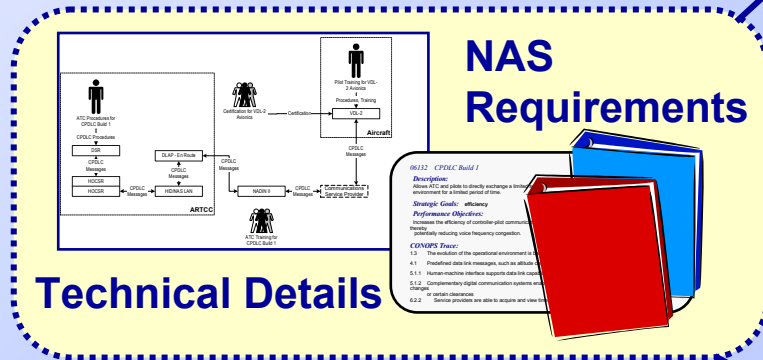


- **The Data Base contains**
 - **All Costs**
 - Research, Capital, and Operations
 - **All Schedules**
 - Research
 - Acquisition
 - Deployment
 - Service Life
 - **All Interdependencies**
 - People
 - Systems
 - Support Activities

**Identify All
Resources and
Schedules to...**

**Sustain Existing
Services &
Deliver New
Capabilities**

**ALL R,E&D, F&E, and Ops Expenditures are captured in
the Architecture Data Base**



NAS Architecture Data Base

- **Technical Data and Interdependencies**
 - Services
 - People
 - Systems
 - Support Activities
- **Requirements**
 - Functional
 - Performance
 - Constraints

Provides the basis to develop requirements, procedures, interfaces, and plans needed by IPTs

Ensures NAS products are implemented using a consistent set of standards

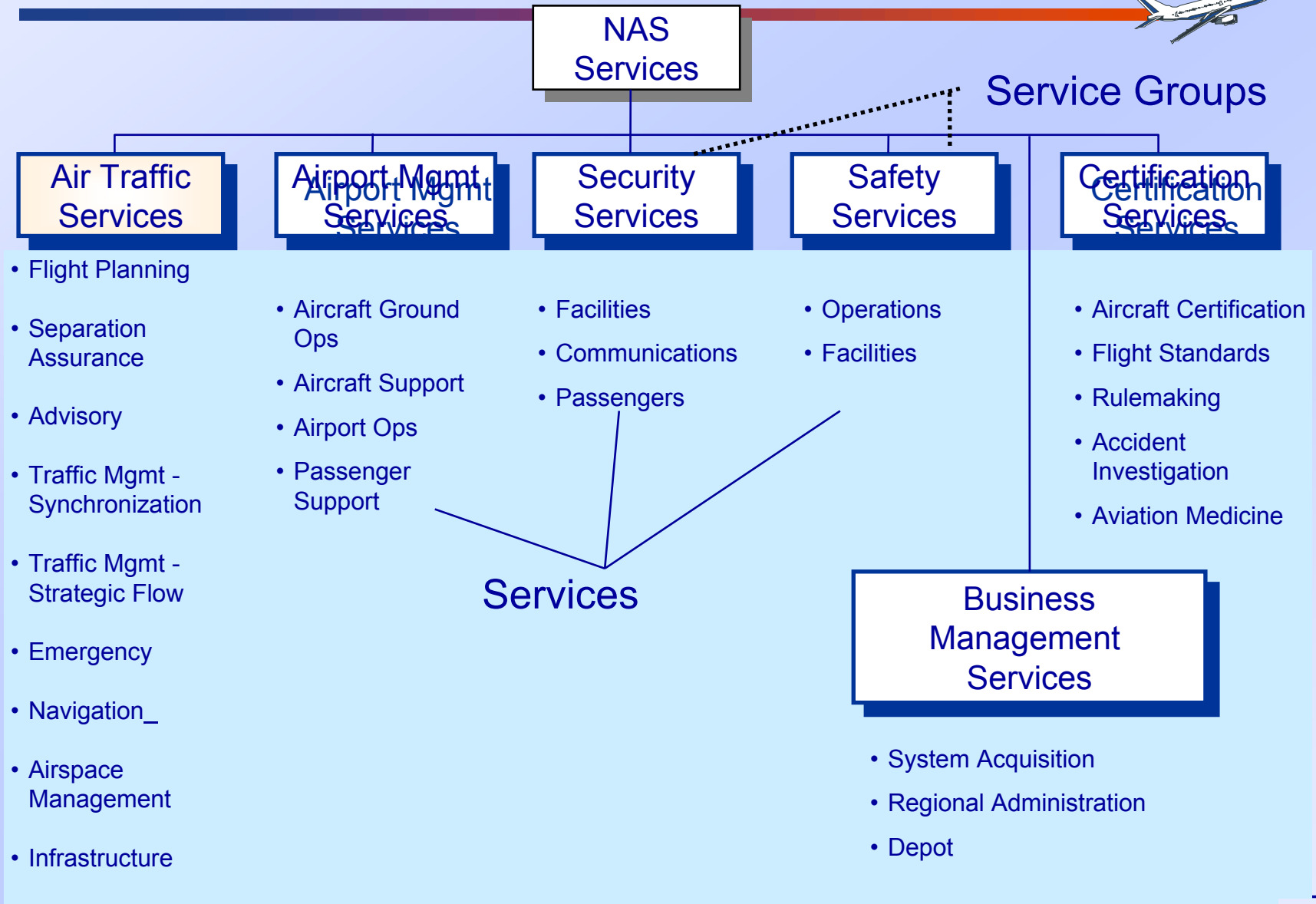
Supports development of NAS-level requirements



- **Focus is on defining and delivering services**
 - **Services:** Meeting aviation industry and public needs
- **Services are decomposed into capabilities**
 - **Capabilities:** Functions and activities necessary to deliver a service
- **Define capabilities in terms of capability implementation steps**
 - **Implementation Steps:** Steps required to deliver future capabilities
- **Define capability implementation steps in terms of mechanisms required**
 - **Mechanisms:** People, systems, and support activities
- **Use this data to populate the Architecture Data Base**

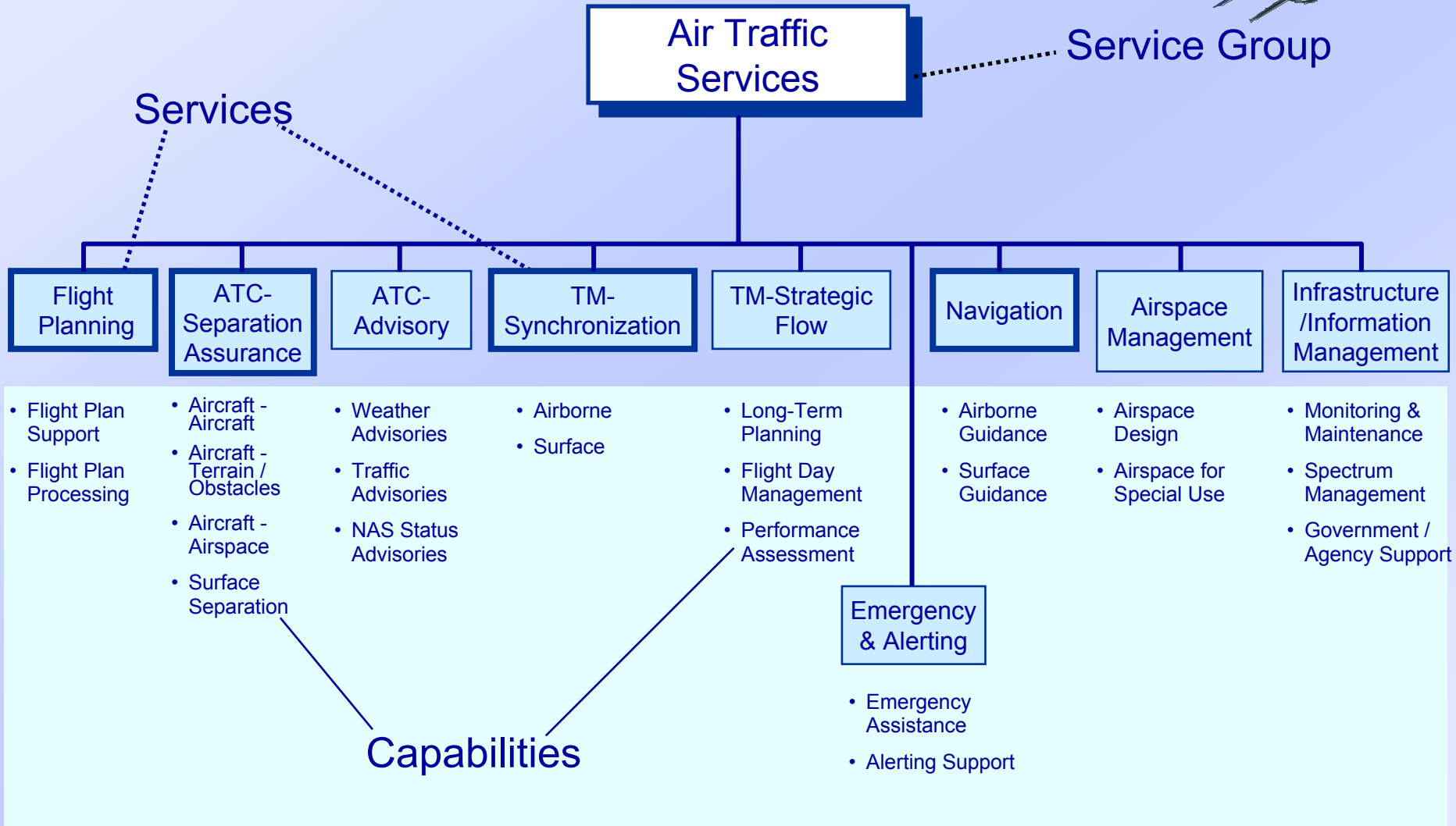


NAS Services





Air Traffic Services





Programs Buy Mechanisms



Programs

...that are Reported to Congress, are composed of...

Projects

...that are managed by FAA organizations, that are composed of...

Segments

...that buy specific...

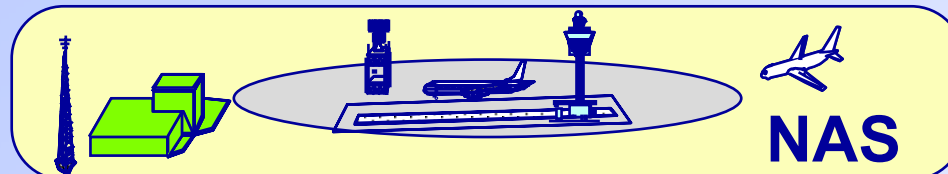
Mechanisms

People

Systems

Support Activities

...that are implemented into the...

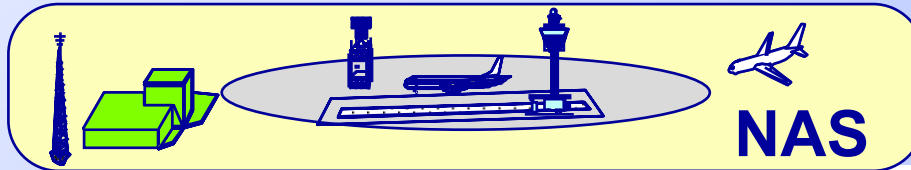




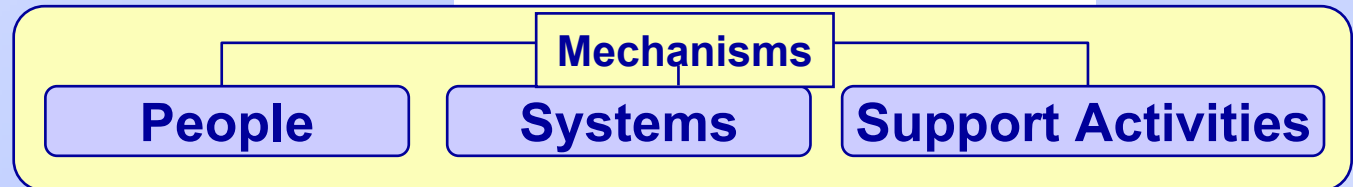
Mechanisms Deliver Services



The NAS...



...is composed of
interactive...



...that combined, provide...

Implementation Steps

...that provide...

Capabilities

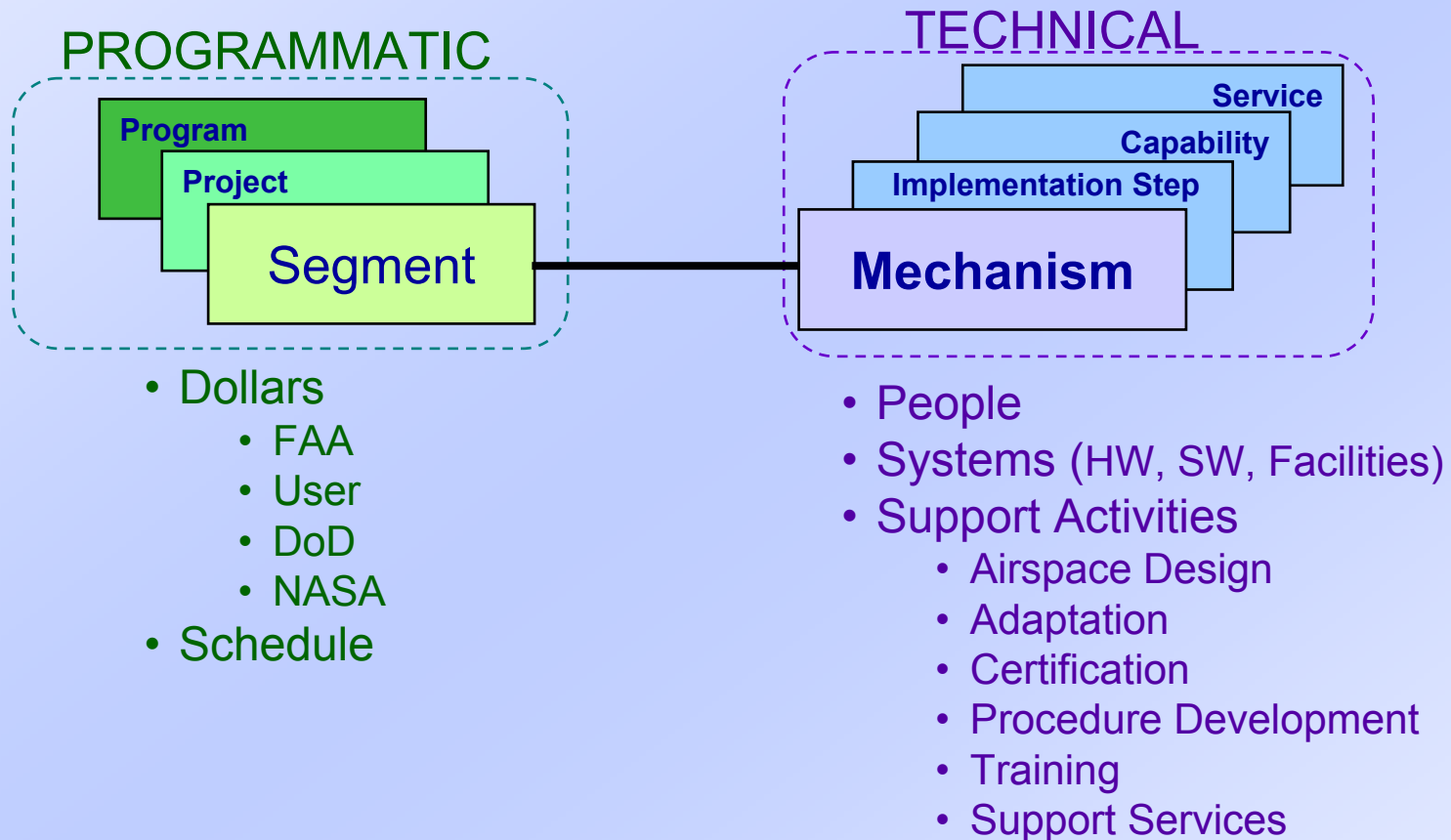
...that deliver...

Services

...that are requested by the Aviation Community



SEGMENT - MECHANISM Pairs



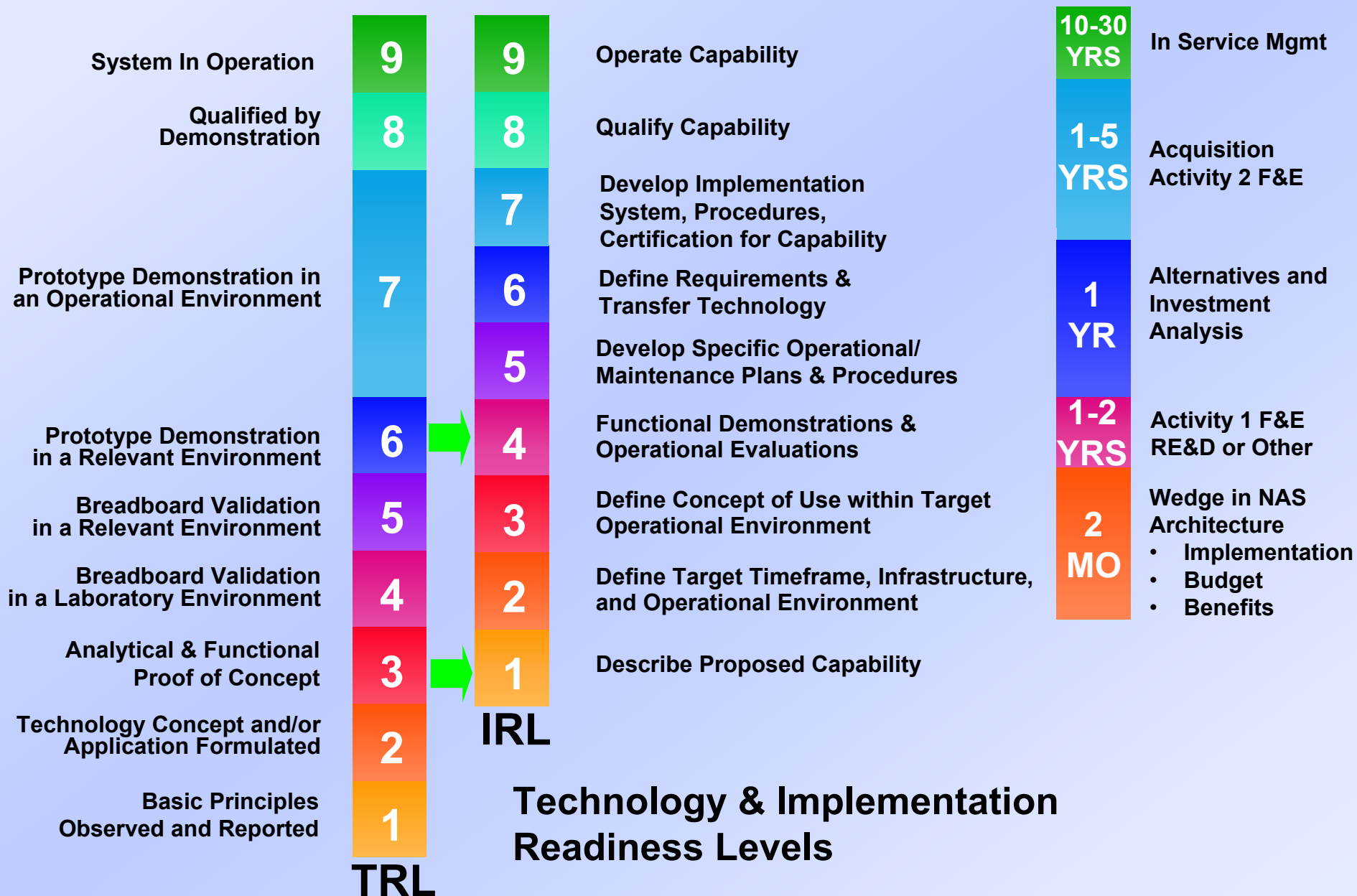
The building blocks of the NAS Architecture Data Base are
UNIQUE Segment-Mechanism pairs



Inserting Current R&D Efforts



- Existing Architecture Elements
 - Are planned Implementation Steps feasible?
 - Are modifications to schedules necessary due to delays in previously assumed research and development efforts?
- Future Implementation Step Definition
 - Evolving technologies make new capabilities feasible?
 - R&D aligned with gaps or shortfalls in existing capabilities?
 - Are timelines reasonable assuming evolution?
 - Can technical solutions be integrated into the NAS without significant procedural changes?
- Planning and Budgeting Wedges





Capability and Architecture Tool Suite (CATS)



The NAS Architecture is available at your desk via CATS

- CATS I supports browser access to NAS Architecture
- FAA Intranet
 - <http://www.cats-i.faa.gov/CATS/CATSI.cfm>
- Public Internet
 - <http://www.nas-architecture.faa.gov>
- Provides user interface into data base



Building Blocks for NAS Architecture Analysis



Developed from NAS expertise and technical knowledge

Programmatic Data

Service Diagrams

Service Descriptions

CATS-I - Microsoft Internet Explorer

Address: <http://129.133.70.3/CATS/CATS1.htm>

SEARCH • HELP

CAPABILITY ARCHITECTURE TOOL SUITE

EXECUTIVE SUMMARY

SERVICES

INFORMATION

PROGRAMS

MECHANISMS

LOCATIONS

ORGANIZATIONS

MODERNIZATION

NAS DOMAINS

ARCHITECTURE

PERFORMANCE MEASUREMENT

SCHEDULES & REPORTS

TUTORIALS & REFERENCE

COMMENT STATUS

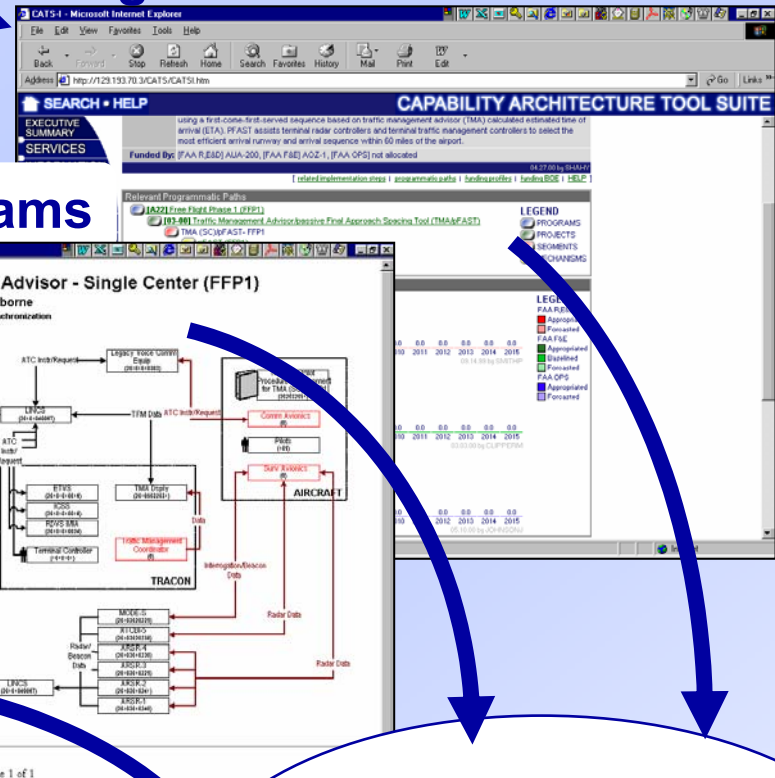
6 Implementation Step Description

Prior to the TMA (Traffic Management Advisor) the Arrival Sequencing Program (ASP) generated metering times and delay values for use by both the TMCs (Traffic Management Coordinators) and sector controllers. Knowledge gained from previous rushes gives TMCs a limited ability to predict future traffic conditions. Sites not equipped with the TMA prototype use ASP.

The TMC develops and initiates flow management plans that mitigate the difference between the expected demand and estimated capacity of the facility. Designed as a strategic flow management tool, TMA helps TMCs work the congested traffic by providing a prediction of near-future traffic conditions. A TMC uses historical knowledge of traffic, a spatially oriented display, a plan view display (PVD), and the Arrival Sequencing Program (ASP) tool to manage the flow of traffic.

The initial implementation of Traffic Management Advisor (TMA) (single center), also referred to as single center metering, is a prototype that provides improved traffic flow to selected airports. It provides en route controllers and traffic managers with arrival scheduling tools to synchronize traffic that is controlled by a single Air Route Traffic Control Center (ARTCC). This planning and controller decision support tool improves the efficiency of sequencing aircraft into arrival gateways and fixes. This implementation provides synchronization capability into airports served predominately or solely by a single ARTCC, and is planned for limited deployment the year 2000 as part of Free Flight Phase 1 (FFP1). Initial deployment of TMA is planned at eight locations: (1) Fort Worth ARTCC, (2) Los Angeles ARTCC, (3) Atlanta ARTCC, (4) Minneapolis ARTCC, (5) Oakland ARTCC, (6) Miami ARTCC, (7) Denver ARTCC, and (8) Chicago ARTCC. This implementation allows rapid deployment of critical capabilities necessary for FFP1 and will provide early benefits to NAS users. These benefits consist of early runway assignments to maximize airport capacity, significant fuel savings, and reduced passenger delays.

The TMA implementation for a single ARTCC is based on the Center-TRACON Automation System (CTAS) prototypes now in operation at Fort Worth ARTCC. Algorithms, displays, and interfaces developed



- Interdependencies
- Traceability
- Operational Use
- Requirements



Implementation Step Descriptions



CATS-I - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit

Address http://129.193.70.3/CATS/CATSI.htm

SEARCH • HELP

EXECUTIVE SUMMARY
SERVICES
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NAS DOMAINS
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PERFORMANCE MEASUREMENT
SCHEDULES & REPORTS
TUTORIALS & REFERENCE
COMMENT STATUS

CATS Project Description
Government/Industry Operational Concept for the Evolution of Free Flight
FFP1 Performance Metrics: An Operational Impact Evaluation Plan
Version 1.0
FFP1 Program Overview, Metrics Plan, Version 1.0

6 Implementation Step Description

Prior to the TMA (Traffic Management Advisor) the Arrival Sequencing Program (ASP) was used by TMCs (Traffic Management Controllers). Knowledge gained from the ASP gives TMCs the ability to manage traffic under various conditions. Sites not equipped with the ASP use AS

The TMC develops and initiates flow management plans based on demand and estimated capacity of the facility. Designated TMCs work the congested traffic by providing a prediction of traffic flow, historical knowledge of traffic, a spatially oriented display, a priority Sequencing Program (ASP) tool to manage the flow of traffic.

The initial implementation of Traffic Management Advisor (TMA) center metering, is a prototype that provides improved traffic flow controllers and traffic managers with arrival scheduling tools to single Air Route Traffic Control Center (ARTCC). This planning improves the efficiency of sequencing aircraft into arrival gateway synchronization capability into airports served predominately for limited deployment the year 2000 as part of Free Flight Phase planned at eight locations: (1) Fort Worth ARTCC, (2) Los Angeles ARTCC, (5) Oakland ARTCC, (6) Miami ARTCC, (7) Minneapolis ARTCC. This implementation strategy allows rapid deployment of critical capabilities to provide early benefits to NAS users. These benefits consist of improved airport capacity, significant fuel savings, and reduced passenger delays.

The TMA implementation for a single ARTCC is based on the Center-TMACON Automation System (CTAS) prototypes now in operation at Fort Worth ARTCC. Algorithms, displays, and interfaces developed for the TMA implementation are being integrated into the CTAS system.

Outline

1. Service Group Name
2. Service Name
3. Capability Name
4. Implementation Step Name
5. Reference Sources
6. Step Description
7. Scenarios
8. People
9. Systems
10. Support Activities
11. Interfaces

Done Internet



Diagram Example

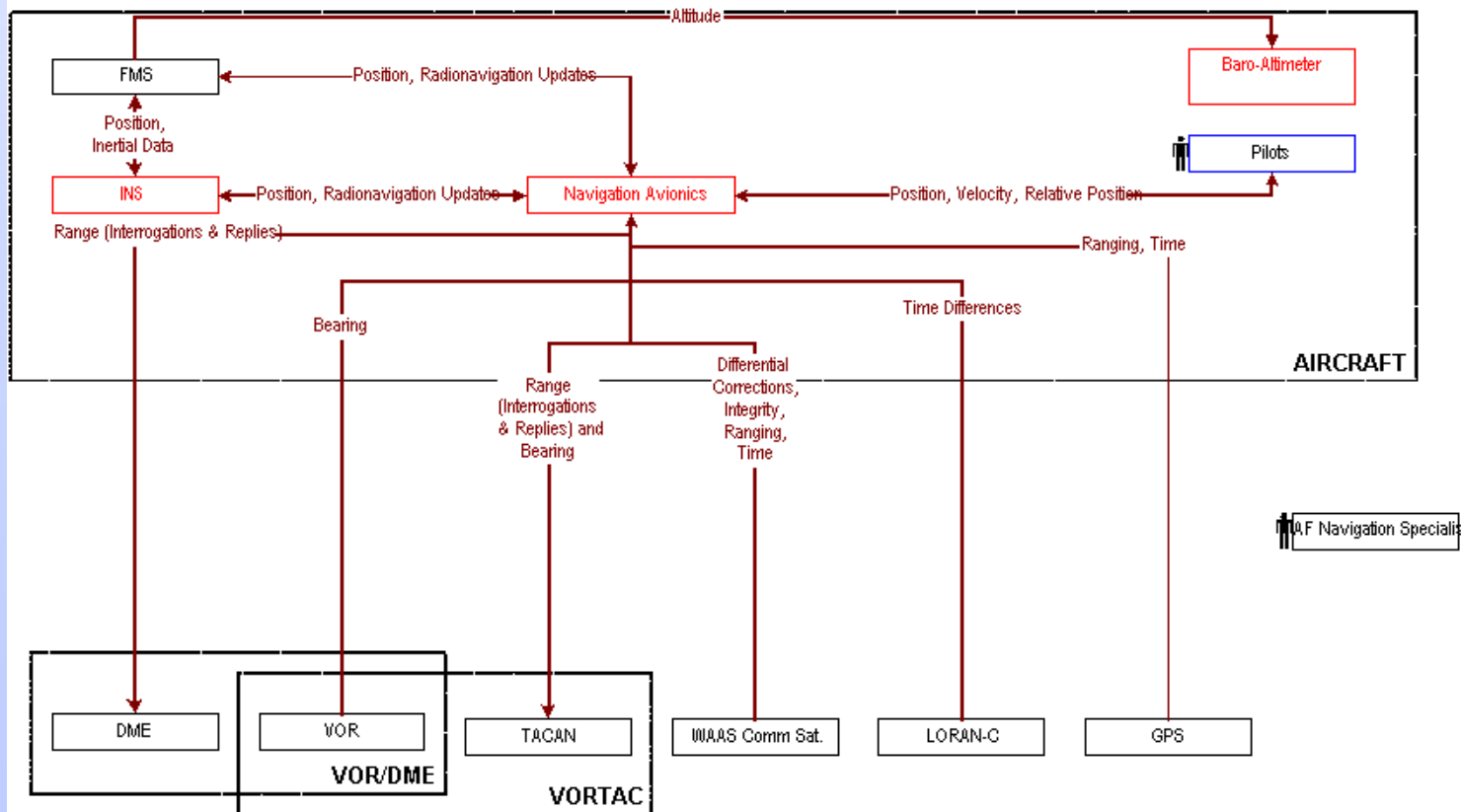
Low Cost Area Navigation Cruise to All Users Using SATNAV



107103 Low Cost Area Navigation Cruise to All User Using SATNAV

Airborne Guidance Capability

Navigation





Summary



- Interface between R&D community and the NAS Architecture aids modernization
 - NAS Architecture defines what is needed
 - R&D defines what is feasible
 - Results in an architecture that provides the greatest benefit to users
- R&D gives the Architecture some needed checks and balances
- The NAS Architecture allows decision makers optimal utilization of limited agency resources
- Mary Stephens-Loggins (202-358-5521) is the ASD R&D/Architecture point of contact